

# Upper Middle Miocene Progradational Play

## MM9 P1, #1461

*Textularia* “W” and *Bigenerina* 2

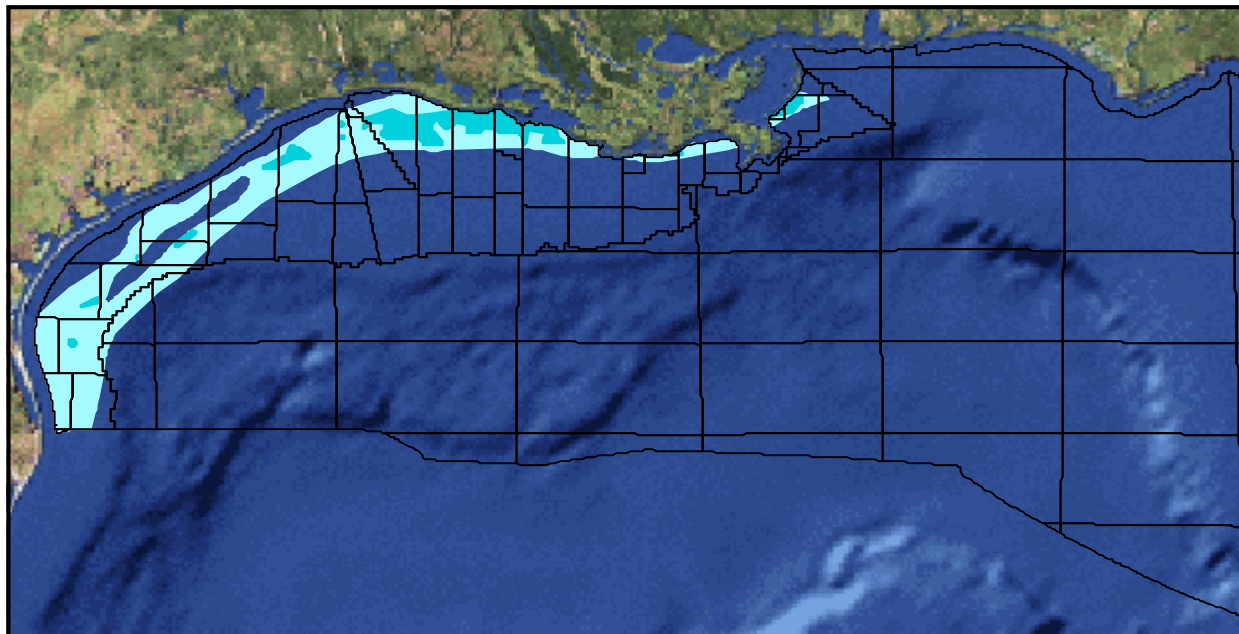


Figure 252. MM9 P1 map showing location of play. Play limit shown in light cyan; hydrocarbon limit shown in dark cyan.

## Overview

The Upper Middle Miocene Progradational Play (MM9 P1) contains reserves of 5,749.018 Bcfg and 105.432 MMbo (1,128.389 MMBOE) in 164 sands in 61 fields. The play extends discontinuously across the modern GOM shelf from the South Padre Island to Main Pass Area ([Figure 252](#)).

## Description

MM9 P1 is defined by (1) a progradational depositional style representing major regressive episodes in which sediments outbuild onto the shelf and slope and (2) the MM-8 and MM-9 Chronozones, the tops of which are defined by the *Textularia* “W” and *Bigenerina* 2 biozones, respectively ([Figure 8](#)).

MM9 P1 extends discontinuously from the South Padre Island Area offshore Texas to the Main Pass Area east of the modern Mississippi River Delta ([Figure 252](#)). In the Texas offshore, hydrocarbons have only been encountered in a few, small, discontinuous clusters. However, hydrocarbon discoveries

are numerous and extend across much of the entire Louisiana offshore.

Depositional systems in MM9 time were similar to those of middle lower Miocene (MM7) time. The South Brazos Delta System (Morton et al., 1985) was the dominant supplier of clastics to the Texas offshore and the ancestral Mississippi River Delta System to the Louisiana offshore.

MM9 P1 extends laterally over a greater geographic area than does the progradational deposits of the MM7 Chronozone, especially to the east from the Eugene Island through Main Pass Area. In addition, progradational sands of MM9 time occur farther basinward than those deposited in MM7 time.

## Play Limits

In an updip direction, MM9 P1 deposits grade into the sediments of the Upper Middle Miocene Aggradational Play (MM9 A1) or extend onshore. MM9 P1 continues to the southwest into onshore Texas and Mexican national waters. To the northeast, the play is limited by the deposits of the Upper Middle Miocene Aggradational/Progradational Play

(MM9 AP1) overlying the lower Cretaceous carbonate shelf. MM9 P1 deposits grade into the sediments of the Upper Middle Miocene Fan 1 Play (MM9 F1) in a downdip direction. In parts of the Mustang Island, Matagorda Island, Brazos, and Galveston Areas offshore Texas, MM9 P1 is limited by the Upper Middle Miocene Structural Corsair Play (MM9 S1).

## Depositional Style

MM9 P1 is characterized by sediments deposited predominantly on the MM9 shelf, with less common, generally finer-grained sediments deposited on the MM9 upper slope. These sediments represent major regressive episodes in which outbuilding of both the shelf and the slope occur. Additionally, retrogradational, reworked sands with a thinning and backstepping log signature locally cap the play. These sands are associated with the *Bigennerina* 2 transgression. Because these retrogradational sands are poorly developed, discontinuous, and not correlatable for any significant distance, they are included as part of MM9 P1. The MM9 progradational interval varies from less than 100 to more than 4,900 ft in thickness, with net sand thicknesses as much as approximately 1,300 ft.

The offshore Texas shelf area received moderate sand input during MM9 time. The amount of sand available was insufficient to develop an extensive sand-rich prograding facies across the offshore Texas shelf and to feed the large accommodation zone of the active, regional Corsair Fault System. Much of the sand was captured along this large fault system in shelf-edge delta deposits that make up MM9 S1. MM9 P1 reservoir facies of the Texas offshore mostly include shelf blanket sands and crevasse splay deposits that are characterized by isolated, prominent, and subdued spiky log patterns.

In contrast to the offshore Texas shelf area, the offshore Louisiana shelf area received higher sand input during MM9 time. The sand amount was sufficient to develop an fairly extensive sand-rich prograding facies across much of the offshore Louisiana shelf. MM9 P1 reservoir facies of the Louisiana offshore mostly include delta fringe sands, channel/levee complexes, and distributary mouth bars. These facies exhibit upward-coarsening (delta fringe and distributary mouth bar) and blocky to upward-fining (channel/levee) log signatures. The thickest sand-dominated intervals probably repre-

sent stacked facies of multiple episodes of delta-lobe switching and progradation.

## Structural Style

The majority of the fields in this play are structurally associated with normal faults. Other less common structures are anticlines, growth fault anticlines, and shallow salt diapirs.

## Quantitative Attributes

On the basis of reserves calculations, MM9 P1 contains 91% gas and 9% oil. The 164 sands in the play comprise 330 reservoirs, of which 304 are non-associated gas, 17 are undersaturated oil, and 9 are saturated oil. All reserves are proved and estimated to be 5,749.018 Bcfg and 105.432 MMbo (1,128.389 MMBOE) ([Table 119](#)). These reserves account for 59% of the reserves for the MM9 Chronozone.

	No. of Sands	Oil (MMbbl)	Gas (Bcf)	BOE (MMbbl)
Proved	164	105.432	5,749.018	1,128.389
Cum. production	163	96.378	5,300.392	1,039.509
Remaining proved	91	9.053	448.626	88.880
Unproved	0	0.000	0.000	0.000

Table 119. MM9 P1 reserves and cumulative production.

Cumulative production from MM9 P1 totals 5,300.392 Bcfg and 96.378 MMbo (1,039.509 MMBOE) from 163 sands in all 61 fields in the play. MM9 P1 production accounts for less than 76% of the MM9 Chronozone's total production. Remaining proved reserves in the play are 448.626 Bcfg and 9.053 MMbo (88.880 MMBOE) in 91 sands in 43 fields.

[Table 120](#) summarizes that water depths of the fields in MM9 P1 range from 11-274 ft, and play interval discovery depths vary from 3,515-16,400 ft, subsea. Additionally, porosity and water saturation range from 18-33% and 16-65%, respectively.

164 Sands	Min	Mean	Max
Water depth (ft)	11	45	274
Subsea depth (ft)	3,515	9,139	16,400
Reservoirs per sand	1	2	13
Porosity	18%	28%	33%
Water saturation	16%	29%	65%

Table 120. MMP P1 sand attributes. Values are volume-weighted averages of individual reservoir attributes.

## Exploration History

MM9 P1 has a 51-year history of discoveries (Figure 253). The first sands in the play were discovered in 1948 and 1949 in the Vermilion 39 Field. The maximum number of sands discovered in any year occurred in 1958 with 10 sands from four fields, adding the maximum yearly reserves of 145.311 MMBOE. This maximum yearly reserves from 10 sands is just slightly larger than the largest single sand in the play discovered in 1948 in the Vermilion 39 Field (Figure 254). Only two other sands in the play contain more than 50 MMBOE. Sand discoveries have been fairly consistent throughout the play's history, averaging about 3 per year. The mean sand size for the play is 6.880 MMBOE. Since the first Atlas database cutoff of January 1, 1995, 8 sands have been discovered, the largest of which is estimated to contain 3.645 MMBOE.

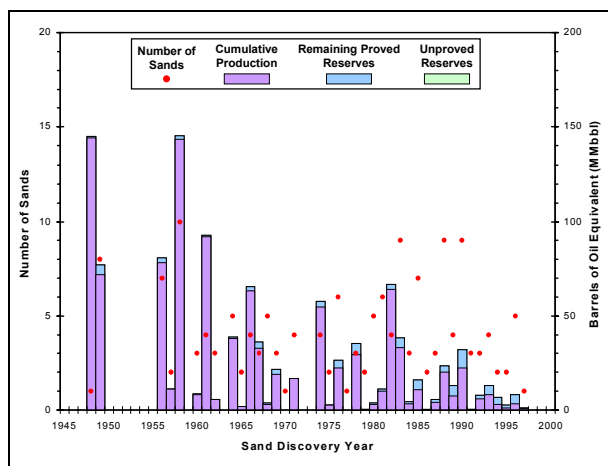


Figure 253. MM9 P1 exploration history graph showing reserves and number of sands discovered by year.

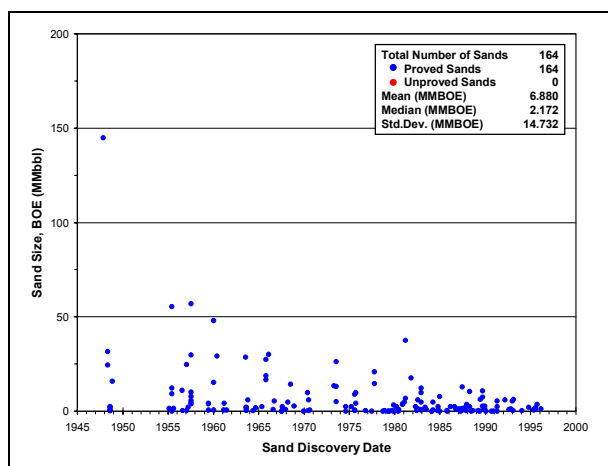


Figure 254. MM9 P1 sand discovery graph showing the size of sands discovered by year.

## Production History

MM9 P1 has a 48-year history of production (Figure 255). Oil and gas production began in 1951. Oil production generally increased throughout the 1950's and 1960's, reached a local peak in 1970, and then decreased slightly and fluctuated in the 1970's. Oil production sharply increased in 1984 and reached its highest level ever in 1986. Since then, yearly oil production values have decreased by about half. Gas production generally increased, as well, throughout the 1950's and 1960's, reaching a peak value in 1970. Since then, yearly gas production values have dropped below the peak value and fluctuated.

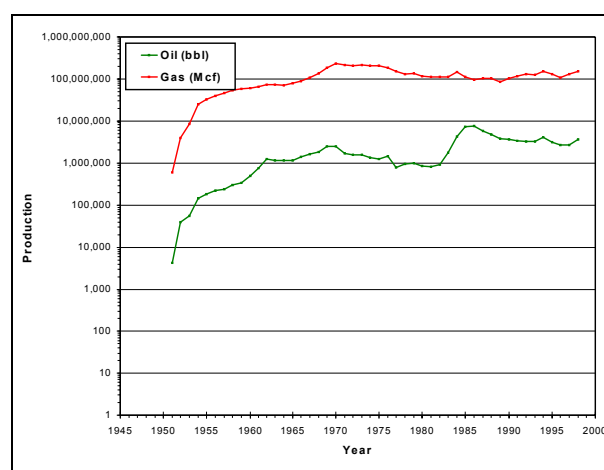


Figure 255. MM9 P1 production graph showing oil and gas production by year.